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# Gulf of Maine cod Updated SCAA/ASPM Assessment



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# MODIFICATIONS

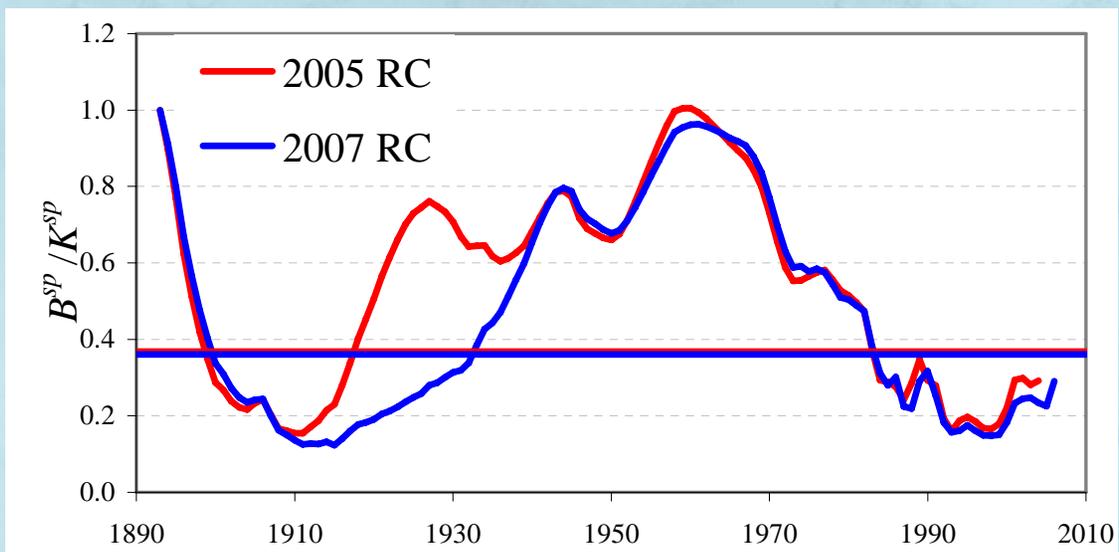
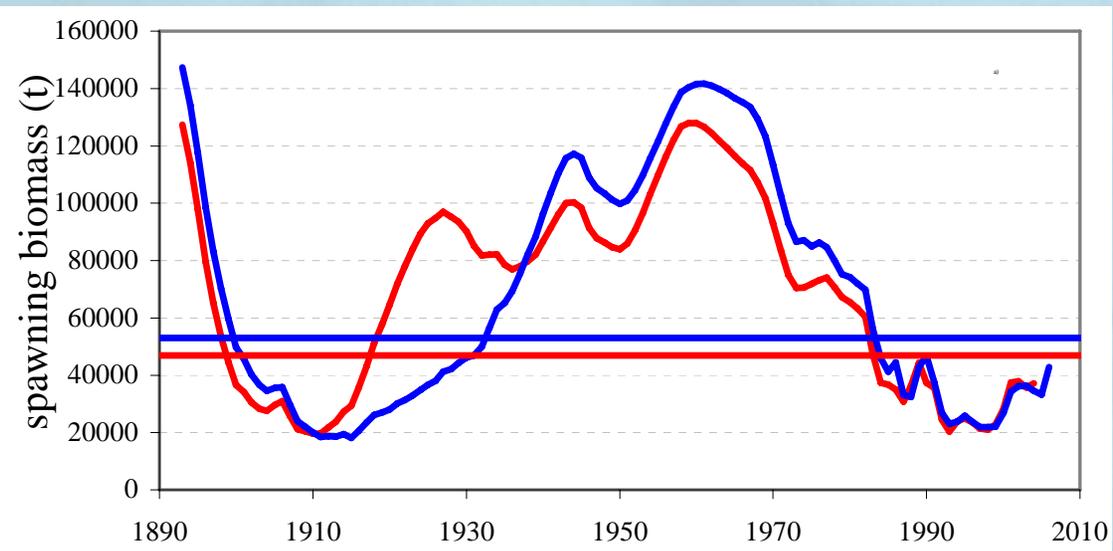
- 2 further years data
- Plus group from 7 to 8 (AIC justified)

# REFERENCE CASE

- $M = 0.2$
- Ricker
- Estimate selectivity freely ( $\Rightarrow$  dome)

Considered "Best" – basis AIC

# $B^{sp}$ TRENDS



# LITTLE EFFECT

- 1970s gear change
- Pope  $\Rightarrow$  Baranov
- Start year  $\Rightarrow$  1960
- Retrospective – little pattern

*M*

- *M*: 0.2  $\Rightarrow$  0.3

Little  $-\ln L$  change

Less domed

Better Status

- *M*: Decrease with age

Worse fit

More domed

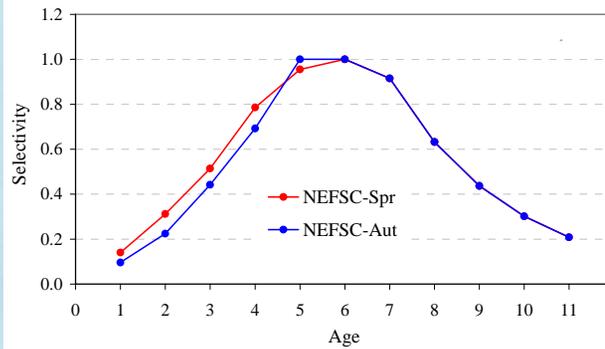
# SELECTIVITY DOME – SIMULATION STUDY

	True	Estimated
NEFSC Survey:		
Age 7	1.00	0.97 (0.84; 1.10)
Age 8	1.00	0.86 (0.76; 0.97)
Commercial:		
Age 6	1.00	0.96 (0.83; 1.08)
Age 7	1.00	0.97 (0.73; 1.16)
Age 8	1.00	0.87 (0.68; 1.02)
$B_{2006}^{sp} / B_{MSY}^{sp}$	1.04	0.98 (0.81; 1.15)

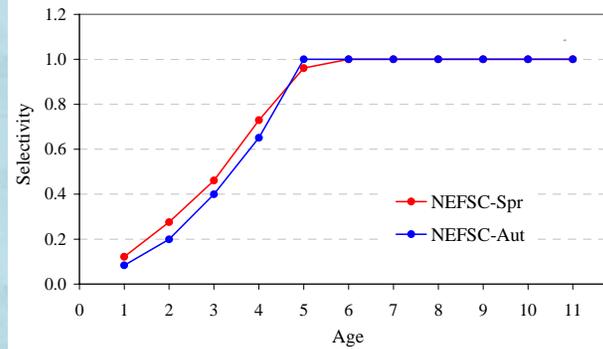
Little bias towards dome

# ESTIMATED SELECTIVITIES

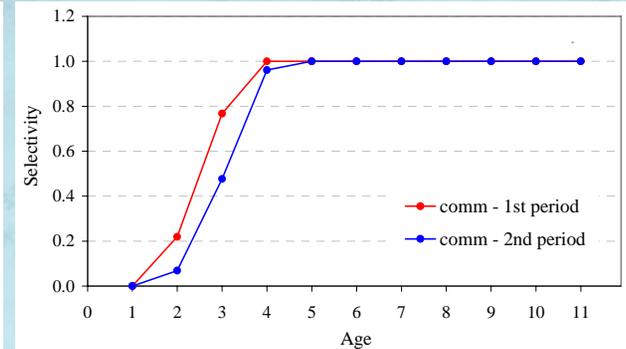
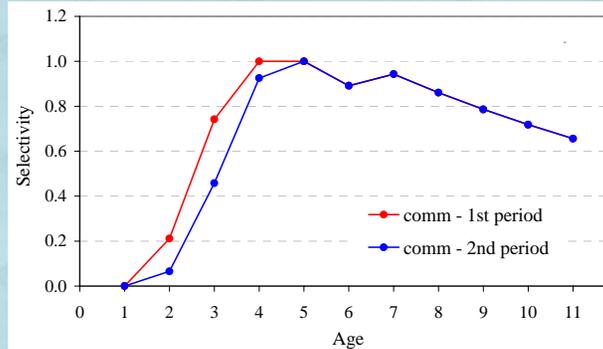
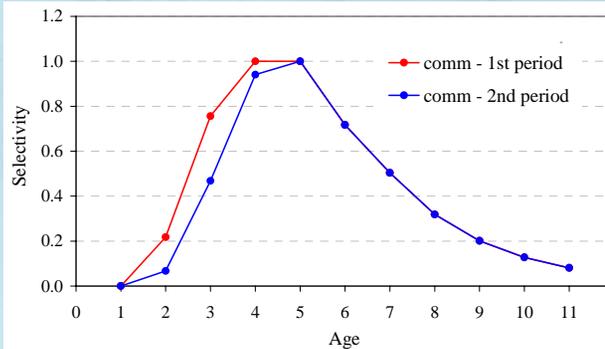
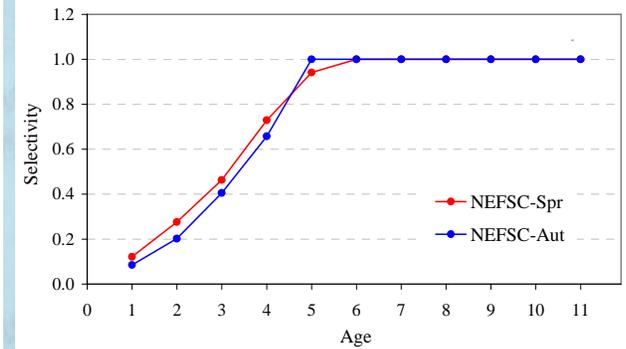
2007 Reference Case



Flat selectivity (survey only)



Flat selectivity (survey and commercial)



# SELECTIVITIES

*-ln L*

Domed

Flat

Ricker

8.3

66.9

Beverton-Holt

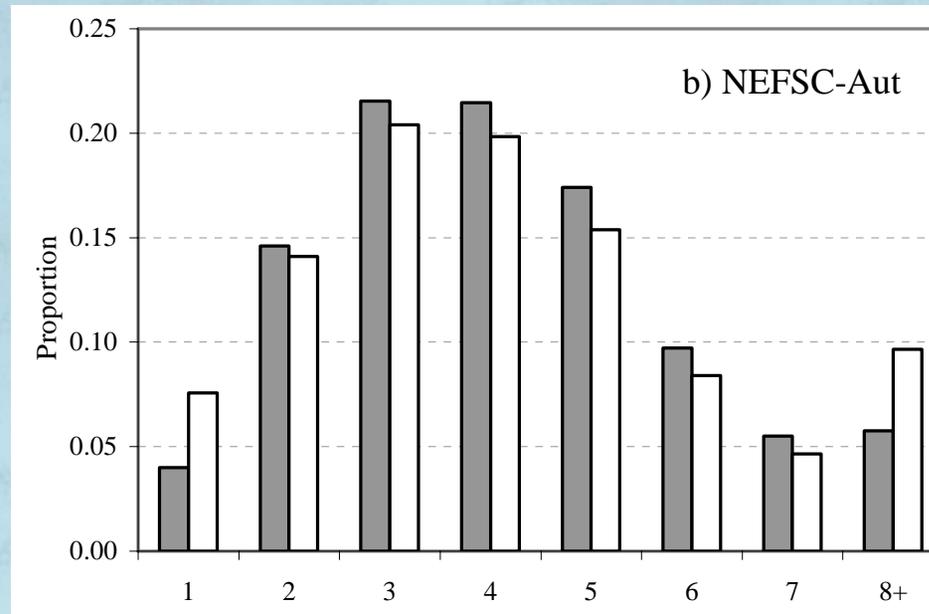
12.5

41.4

**FLAT SELECTIVITY STRONGLY REJECTED**

**AIC WEIGHT  $< 10^{-13}$**

# FLAT SELECTIVITY PROBLEM



Dark: data

Open: model

Too few older fish caught

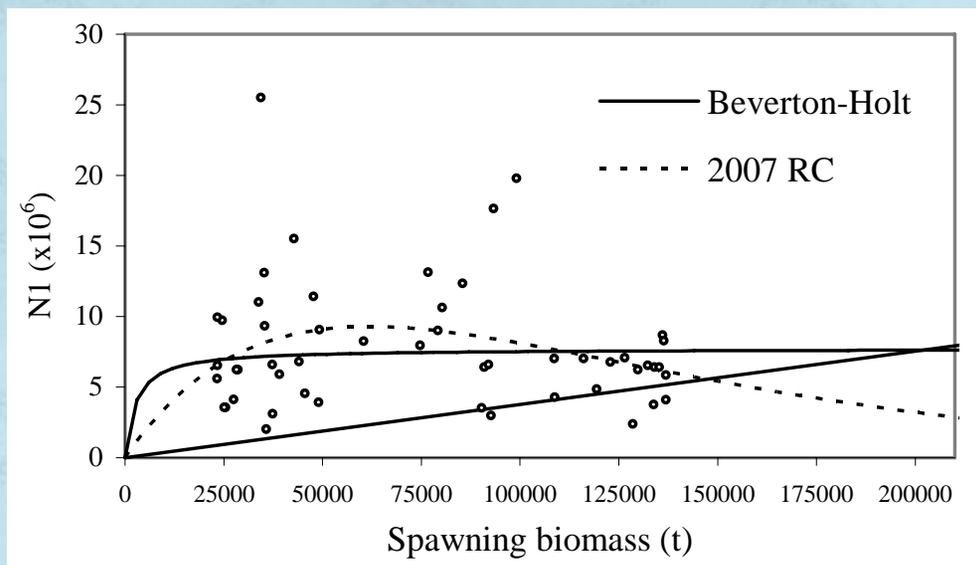
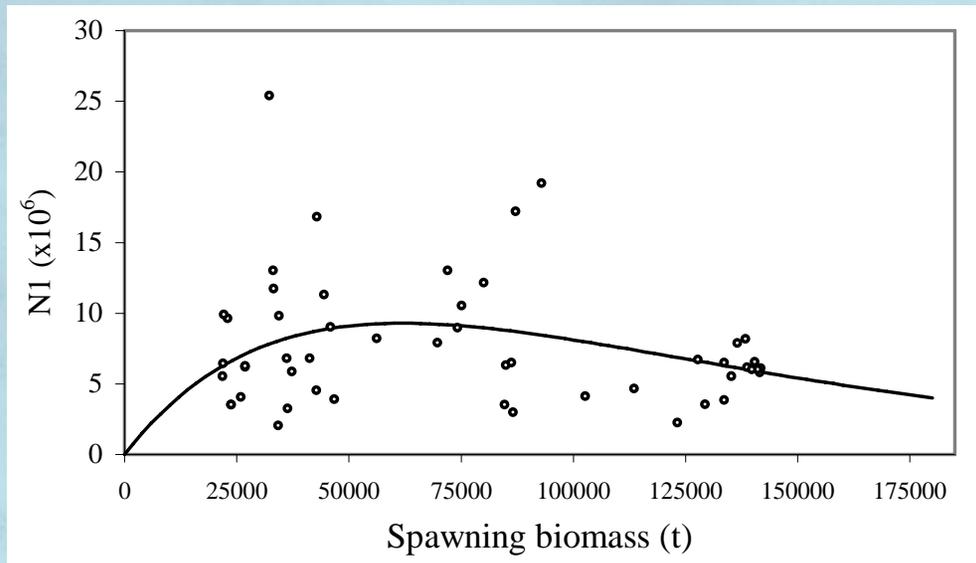
Incompatible with the data

# STOCK RECRUITMENT

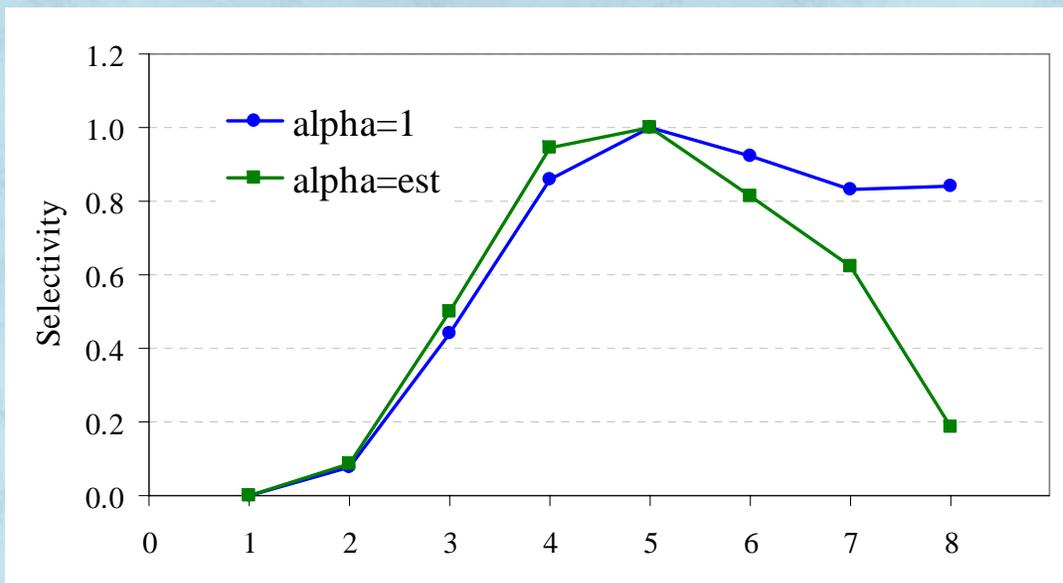
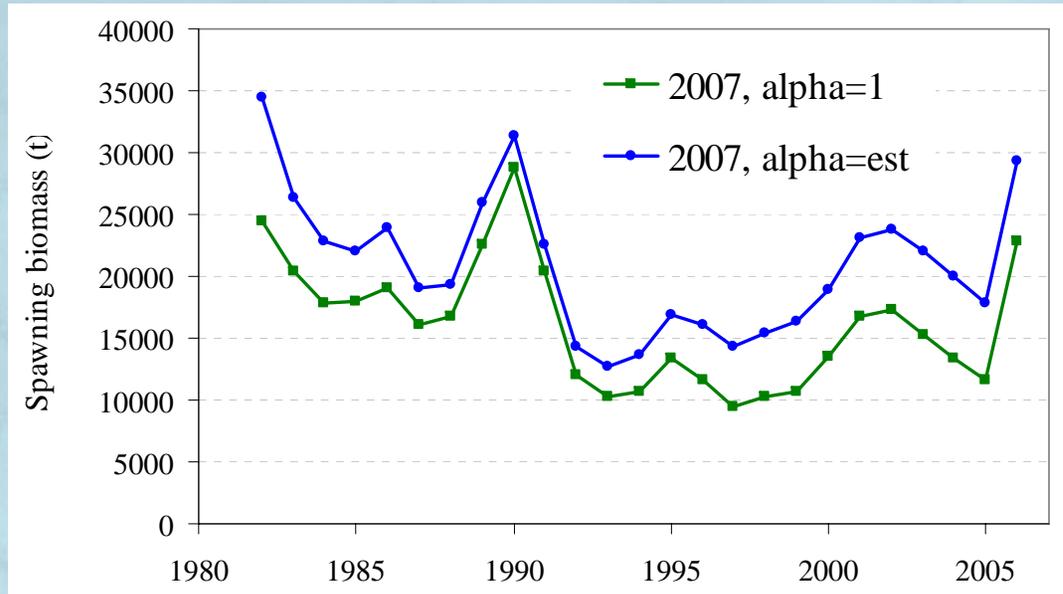
- Generalised Ricker  $R = \alpha B^{sp} \exp[-\beta(B^{sp})^\gamma]$

$\gamma$	$-\ln L$
1.19 (best)	8.2
1 (Ricker)	8.3
0.25	10.9
Bev-Holt	12.5

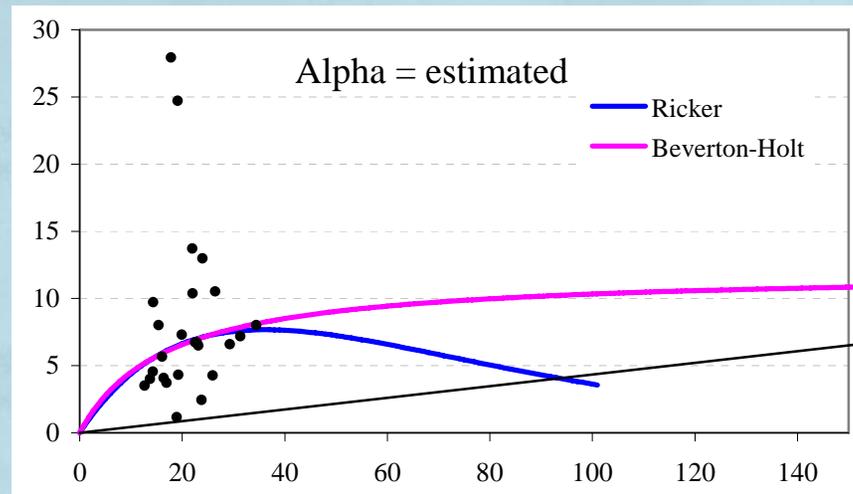
# STOCK-RECRUIT PLOTS



# ALT-VPA Assessments



# VPA Stock-Recruitment



-lnL difference Ricker vs Beverton-Holt

VPA 0.04

ASPM 4.2

VPA restricted to 1982-2006 data cannot distinguish

VPA not reliable basis for Reference Point estimation  
(too imprecise)

# ASPM REFERENCE POINTS

	Ricker	Beverton-Holt
$B^{sp}_{2006}$	43	43
$B^{sp}_{MSY}$	53	33
$B^{sp}_{2006} / B^{sp}_{MSY}$	0.81	1.30
$F_{2006}$	0.17	0.18
$F_{MSY}$	0.46	0.58

Biomass: '000t

F: Age 5 commercial